

# PATENT ABSTRACTS OF JAPAN

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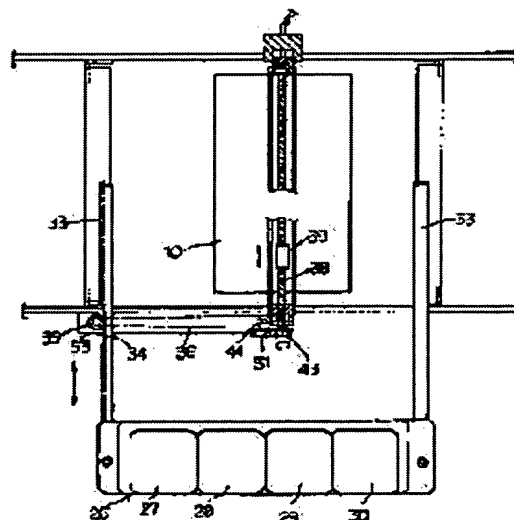
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## (54) IMAGE FORMING DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To inexpensively provide the electrifying wire cleaning mechanism of an image forming device where wire cleaning operation need not be performed with special care and the wire cleaning operation is performed during maintenance and an excellent image without having electrification unevenness is maintained.

**SOLUTION:** A rack gear 34 is formed on slide rail 33, and is meshed with a pinion gear 35 pivotally supported at the image forming device. A feed screw shaft 38 is arranged in parallel with the wire of an electrifier, and a wire cleaning movable member 39 is screwed in the feed screw shaft 38. The wire for transmitting driving 36 is laid between a driving transmission mechanism and the pinion gear 35, and the wire is cleaned by moving the wire cleaning movable member 39 from the front side to the rear side of the wire by the rotation of the feed screw shaft 38 made by the pulling-out/returning movement of a toner hopper 26.



## LEGAL STATUS

[Date of request for examination]

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CLAIMS

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[Claim(s)]

[Claim 1] Image formation equipment characterized by having the cleaning system which cleans the wire of cash-drawer and corona-electrical-charging [ in / synchronizing with the cash drawer and return migration actuation of a movable toner hopper and this toner hopper / it returns and / image support ] equipment to the body of image formation equipment containing a developer.

[Claim 2] Image formation equipment of claim 1 characterized by the driving source for performing the cash drawer and return migration actuation of the above-mentioned toner hopper serving as the driving source of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

[Claim 3] Image formation equipment of claims 1 or 2 characterized by establishing a torque-limiter device into the actuation transfer device between the cash drawer and return migration actuation of the above-mentioned toner hopper, and cleaning actuation of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

[Claim 4] Image formation equipment of claim 3 characterized by setting up more greatly than the die length which should clean a wire the movement magnitude of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the wire cleaning system of the corona-electrical-charging equipment especially in image support about the image formation equipment which used electrophotography methods, such as a copying machine, facsimile, and a printer.

[0002]

[Description of the Prior Art] The cleaning system of the wire of the corona-electrical-charging equipment in the conventional image support is roughly classified into the following three kinds. That is, the wire cleaning system of the 1st conventional corona-electrical-charging equipment has some which move a wire cleaning member manually as shown in JP,2-296270,A, fix a cleaning member and operate electrification equipment. The wire cleaning system of the 2nd conventional corona-electrical-charging equipment is automatically operated according to the drive and actuation controlling mechanism which prepared the wire cleaning member separately as shown in JP,2-103572,A. And the wire cleaning system of the 3rd conventional corona-electrical-charging equipment cleans a wire by the cleaning member prepared in this unit at the time of drawer actuation of other units, such as a development unit, as shown in JP,63-98673,A or a JP,63-226673,A official report.

[0003]

[Problem(s) to be Solved by the Invention] However, there is a problem that a wire cleaning activity is indispensable as a machine maintenance in the wire cleaning system of the 1st conventional corona-electrical-charging equipment. While a wire cleaning activity is possible, without stopping a machine by automatic control in the wire cleaning system of the 2nd conventional corona-electrical-charging equipment, machine part mark increase and there is a problem of becoming expensive. Although the wire cleaning system of the 3rd conventional corona-electrical-charging equipment is simple, a wire can be cleaned only at the time of the machine maintenance of exchange of a development unit, exchange of a photo conductor, etc., but there is a problem that where of the wire dirt by adhesion on the wire of the toner which arose between the machine maintenance and the machine maintenance and dispersed in the inside of a plane etc. cannot be cleaned, in comparatively long so-called medium speed, high-speed machine, and color machine with many amounts of activity toners of a machine maintenance period.

[0004] In view of the above-mentioned conventional trouble, it is not necessary to perform this invention being conscious of a wire cleaning activity, and aims at offering cheaply the electrification wire cleaning system which the nonconformity by poor electrification, such as electrification unevenness, does not produce by doing a wire cleaning activity also between maintenances.

[0005]

[Means for Solving the Problem] The image formation equipment applied to claim 1 among this inventions is characterized by having the cleaning system which cleans the wire of cash-drawer and corona-electrical-charging [ in / synchronizing with the cash drawer and return migration actuation of a movable toner hopper and this toner hopper / it returns and / image support ] equipment to the body of image formation equipment containing a developer. In order to expose a toner feed hopper ahead of an image formation equipment body at the time of toner makeup, the cash drawer and return migration of the toner hopper are carried out.

[0006] The image formation equipment concerning claim 2 is characterized by the driving source for performing the cash drawer and return migration actuation of the above-mentioned toner hopper serving as the driving source of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

[0007] The image formation equipment concerning claim 3 is characterized by establishing a torque-limiter device into the actuation transfer device between the cash drawer and return migration actuation of the above-mentioned toner hopper, and cleaning actuation of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

[0008] The image formation equipment concerning claim 4 is characterized by setting up more greatly than the die length which should clean a wire the movement magnitude of the wire cleaning system of the above-mentioned corona-electrical-charging equipment.

[0009]

[Embodiment of the Invention] Hereafter, the configuration of the color copying machine concerning 1 operation gestalt of this invention and actuation are explained with reference to a drawing.

[0010] Although drawing 1 is the whole color copying machine block diagram of 1 operation gestalt of the image formation equipment concerning this invention and a color picture is read with the scanner 2 of a color copying machine 1, reading of the color picture is performed by passing a lens 5 and carrying out image formation of the manuscript image to the color image sensors 6 by the manuscript lighting lamp 3 and the mirror group 4 which are driven by the motor which is not illustrated.

[0011] And color transform processing is performed in the image-processing section which is not illustrated based on the level of the color-separation picture signal of R (red: Red), G (green: Green), and B (blue: Blue) which were obtained with the scanner 2 on the strength, and the color picture data of Bk (black: Black), C (cyanogen color: Cyan), M (MAZENDA color: Magenta), and Y (yellow: Yellow) are obtained.

[0012] This color picture data is changed into a lightwave signal, performs the optical writing corresponding to a manuscript image through the polygon mirror 7, the  $f/\theta$  lens 8, and the reflective mirror 9 with laser, and forms an electrostatic latent image in the photo conductor drum 10 which is image support. This electrostatic latent image is developed with a developing machine 11, and it imprints on the medium imprint belt 12. The toner image of 4 color piles is formed on the medium imprint belt 12 by performing this actuation about each color picture data of Bk, C, M, and Y.

[0013] This 4 color pile toner image uses and imprints the paper imprint roller 13 to the transfer paper which has been sent with the resist roller which is not illustrated and which is not illustrated. A transfer paper is discharged, after a fixing assembly 15 conveys this transfer paper in the paper conveyance unit 14 and heat-of-fusion fixation of the toner image is carried out on a transfer paper.

[0014] Drawing 2 is the schematic diagram showing the configuration of the circumference of the photo conductor drum of the color copying machine of 1 operation gestalt of the image formation equipment concerning this invention. Around the cylinder-like photo conductor drum 10, the electrification equipment 16 and the latent-image formation section 18 which have the corona wire 17 inside, a developing machine 11, the medium imprint belt 12, the front [ cleaning ] electrification machine 23, cleaning equipment 24, and the aligner 25 for photo conductor electric discharge are arranged counterclockwise. Inside the developing machine 11, the Bk developing machine 19, the C developing machine 20, the M developing machine 21, and the Y developing machine 22 are counterclockwise arranged in order around the photo conductor drum 10.

[0015] This color copying machine operates as follows. That is, in the latent-image formation section 18, a latent image is first formed in the photo conductor drum 10 uniformly charged by the corona discharge from the corona wire 17 of electrification equipment 16 by the laser beam, and a toner image is formed in it after that with one development counter of the Bk developing machine 19 of a developing machine 11, the C developing machine 20, the M developing machine 21, and the Y developing machine 22. A toner image is imprinted to the medium imprint belt 12 after that. On the other hand, after the electrification machine 23 before cleaning adjusts the amount of electrifications of the photo conductor drum 10, the residual toner on the photo conductor drum 10 is removed with cleaning equipment 24, and are collected. After that, the photo conductor drum 10 carries out optical

electric discharge with the aligner 25 for photo conductor electric discharge, and is returned to an initial state. The above-mentioned cycle is repeated and a color copy is performed.

[0016] The toner hopper 26 is arranged on the front face of a color copying machine. In this toner hopper 26, a batch is in the Bk toner compartment 27, the C toner compartment 28, the M toner compartment 29, and the Y toner compartment 30, and Bk toner, C toner, M toner, and Y toner are contained in each.

[0017] Drawing 3 is the partial cross-section side elevation of the toner hopper circumference of the color copying machine of 1 operation gestalt of the image formation equipment concerning this invention. It usually connects with the developing machines 19, 20, 21, and 22 of each color, the toner compartments 27, 28, and 29 of each color and the coil 31 in 30 rotate at the time of the need, and the toner hopper 26 supplies a toner to developing machines 19, 20, 21, and 22 like an arrow head A. It conveys and \*\*\*\* with developing machines 19, 20, and 21 and the coil 32 in 22 after that in the depth direction of arrow-head B, i.e., the direction of drawing 3. When the toner compartments 27, 28, and 29 of one of colors and the toner in 30 are lost, the toner hopper 26 is guided by the slide rail 33 a toner hopper cash drawer and for return, and is made to carry out a cash drawer and return migration ahead [ of image formation equipment ].

[0018] Drawing 4 is the top view of the toner hopper circumference of the color copying machine of 1 operation gestalt of the image formation equipment concerning this invention. Drawing 5 is the sectional view of the wire circumference of the color copying machine of 1 operation gestalt of the image formation equipment concerning this invention. The rack gear 34 is formed in a part of piece side face of the slide rail 33, and this rack gear 34 meshes with the pinion gear 35 supported to revolve by the propleuron of the body of image formation equipment.

[0019] On the other hand, the feed screw shaft 38 is arranged to the wire 37 of electrification equipment 16, and parallel, and it has attached in the bearing material 42 attached in image formation equipment free [ a revolution ]. The spur gear 43 is attached in the end of this feed screw shaft 38.

[0020] Furthermore, the moving-part material 39 for wire cleaning which is the feed screw nut which formed the screw thread in the inner surface is screwing in this feed screw shaft 38. The moving-part material 39 for wire cleaning had two lobes 40 which project in the side by the side of the same, and had the breakthrough which penetrates and cleans a wire 37 at the head of this lobe 40, respectively, and has contained the wire cleaning member 41, respectively. This wire cleaning member 41 contains abrasives, and has the breakthrough which penetrates and cleans a wire 37. And since the wire 37 has penetrated the breakthrough of the lobe 40 of the moving-part material 39 for wire cleaning, and the breakthrough of the wire cleaning member 41, when the moving-part material 39 for wire cleaning moves in accordance with the feed screw shaft 38, the front face of a wire 37 is cleaned.

[0021] If it has built over the wire 36 for actuation transfer between the pinion gears 35 and pulleys 44 which gear with the rack gear 34 formed in the slide rail 33 and the slide rail 33 moves, the pinion gear 35 will rotate and revolution actuation of the pulley 44 will be carried out through the wire 36 for actuation transfer.

[0022] The friction member 46 is pasted up on the following table side in drawing 5 of this pulley 44. The pulley 44 is \*\*\*\*(ed) free [ a revolution ] on the shaft 45, and installation and the friction member 46 of a pulley 44 touch the top face in drawing 5 of a bevel gear 48 in the bevel gear 48 at the head of a shaft 45. The end of a shaft 45 is attached in the bearing 52 of image formation equipment free [ a revolution ]. The spring 47 is caught between the top faces and bearings 52 in drawing 5 of a pulley 44, and it is energizing so that the friction member 46 of a pulley 44 may be close to the top face of a bevel gear 43.

[0023] The spur gear 51 is further attached in the shaft 50 for the bevel gear 48 and the meshing bevel gear 49 at installation and this shaft 50. This spur gear 51 meshes with the spur gear 43 attached in the end of the above-mentioned feed screw shaft 38. [0024] For this reason, at the time of toner makeup, the pinion gear 35 which meshes with a cash drawer and the rack gear 34 formed in the slide rail 33 when it returns and moves and the slide rail 33 was made to slide rotates the toner hopper 26, and revolution actuation of the pulley 44 is carried out through the wire 36 for actuation transfer. Since the friction member 46 of the front face of a pulley 44 is close to the bevel gear 48,

revolution actuation of the bevel gear 48 is carried out, and revolution actuation also of a bevel gear 48 and the meshing bevel gear 49 is carried out. About 90 degrees of the directions of a revolving shaft are changed by these bevel gears 48 and 49. And revolution actuation of the spur gear 51 attached in the same shaft 50 as a bevel gear 49 is carried out, and revolution actuation of a spur gear 51 and the meshing spur gear 43 is carried out. Since the spur gear 43 is attached in the feed screw shaft 38, revolution actuation of the feed screw shaft 38 is carried out. A revolution of the feed screw shaft 38 moves the feed screw shaft 38 and the moving-part material 39 for wire cleaning to screw to a cross direction in accordance with the feed screw shaft 38 according to the hand of cut of the feed screw shaft 38.

[0025] The lobe 40 of the moving-part material 39 for wire cleaning penetrated the wire 37, and has sandwiched it from both sides. After only the fixed rotational frequency made the one direction rotate the feed screw shaft 38 and moved the moving-part material 39 for wire cleaning to the back side of a wire 37 from the near side of a wire 37, By only the same rotational frequency's carrying out counterrotation of the feed screw shaft 38, and returning the moving-part material 39 for wire cleaning from the back side of a wire 37 to the near side of a wire 37 The nitrogen oxides generated by the toner adhering to the front face of a wire 37, dust, and discharge are removable covering the overall length.

[0026] That is, the moving-part material 39 for wire cleaning which suited the near side of a wire 37 in early stages a cash drawer and by returning and moving moves the toner hopper 26 in the direction of the back of a wire 37, and the moving-part material 39 for wire cleaning moves [ of a wire 37 ] to the near side of a wire 37 from the back after that. Although the rotational frequency of the feed screw shaft 38 is decided according to the amount of cash drawers of the toner hopper 26 and the movement magnitude of the moving-part material 39 for wire cleaning is decided, in the color copying machine of this operation gestalt, the movement magnitude of the moving-part material 39 for wire cleaning is set up more greatly than the movable amount of the actual moving-part material 39 for wire cleaning. This is for moving certainly the moving-part material 39 for wire cleaning to the back side of a wire 37 from the near side of a wire 37.

[0027] On the other hand, although the moving-part material 39 for wire cleaning which reached the back side of a wire 37 receives the driving force which goes to a back side further, according to the torque-limiter device by the bevel gear 48 which carries out a pressure welding to the friction member member 46 of a pulley 44, and it, the friction member member 42 does not rotate henceforth to a skid, and bevel gears 48 and 49 do not rotate it to a forward hand of cut. Even if the adhering firm affix is in a wire 37 by establishing a torque-limiter device into an actuation transfer device, the nonconformity an excessive load is not applied to the moving-part material 39 for wire cleaning or feed screw shaft 38 grade, and the moving-part material 39 grade for wire cleaning breaks is avoidable.

[0028] Moreover, if the drive motor 53 which drives the pinion gear 35 is formed as shown in drawing 5 , while a cash drawer and return migration will perform wire cleaning for the toner hopper 26, wire cleaning can be performed by driving a drive motor 53 at any time.

[0029] In explanation of the above operation gestalt, although cleaning of a corona wire is explained, this invention can be applied also to cleaning of a grid wire, and both cleaning of a corona wire and cleaning of a grid wire may be performed.

[0030]

[Effect of the Invention] Since wire cleaning of corona-electrical-charging equipment is performed synchronizing with a cash drawer and return migration of a toner hopper according to the image formation equipment concerning claim 1, Even if photo conductor exchange, developer exchange, etc. are the stages between maintenances, wire cleaning can be performed at moderate spacing. It always maintains a wire at clarification and it is not only effective in a good image without image degradation by electrification unevenness being maintainable, but is effective in not doing a wire cleaning activity specially.

[0031] According to the image formation equipment concerning claim 2, it is effective in the ability to clean a wire with a cash drawer and return migration of a toner hopper for it to to be not only effective in the ability to reduce [ since the driving source of a toner hopper and the driving source of a wire cleaning system are the same, it is unnecessary in the driving source only for wire cleaning,

and ] cost, but.

[0032] It is effective in the ability to continue without [ without according to the image formation equipment concerning claim 3 it damages the moving-part material for wire cleaning even when an excessive load is added during wire cleaning at the moving-part material for wire cleaning since the torque-limiter device is established during actuation transfer, and ] a cash drawer and return migration of a toner hopper stopping.

[0033] Since the movement magnitude of the cleaning equipment of the electrification equipment by a cash drawer and return migration of a toner hopper is set up more greatly than the die length which should clean a wire according to the image formation equipment concerning claim 4, since the moving-part material for wire cleaning can always carry out rear-spring-supporter migration from the near side of a wire at the back side of a wire at the overall length of a wire, it is effective in the ability to be able to clean to near the edge of a wire.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the whole color copying machine block diagram of 1 operation gestalt of the image formation equipment concerning this invention.

[Drawing 2] It is the schematic diagram showing the configuration of the circumference of agreement phasome.

[Drawing 3] It is the partial cross-section side elevation of this toner hopper circumference.

[Drawing 4] It is the top view of this toner hopper circumference.

[Drawing 5] It is an enlarged drawing by the side of before this electrification equipment.

[Description of Notations]

- 1 Color Copying Machine
- 2 Scanner
- 3 Manuscript Lighting Lamp
- 4 Mirror Group
- 5 Lens
- 6 Color Image Sensors
- 7 Polygon Mirror
- 8 F/theta Lens
- 9 Reflective Mirror
- 10 Photo Conductor Drum
- 11 Developing Machine
- 12 Medium Imprint Belt
- 13 Paper Imprint Roller
- 14 Paper Conveyance Unit
- 15 Fixing Assembly
- 16 Electrification Equipment
- 17 Corona Wire
- 18 Latent-Image Formation Section
- 19 Bk Development Counter
- 20 C Development Counter
- 21 M Development Counter
- 22 Y Development Counter
- 23 Front [ Cleaning ] Electrification Machine
- 24 Cleaning Equipment
- 25 Aligner for Photo Conductor Electric Discharge
- 26 Toner Hopper
- 27 Bk Toner Compartment
- 28 C Toner Compartment
- 29 M Toner Compartment
- 30 Y Toner Compartment
- 31 32 Coil
- 33 Slide Rail
- 34 Rack Gear

35 Pinion Gear  
36 Wire for Actuation Transfer  
37 Wire  
38 Feed Screw Shaft  
39 Moving-Part Material for Wire Cleaning  
40 Lobe  
41 Wire Cleaning Member  
42 Bearing Material  
43 51 Spur gear  
44 Pulley  
45 50 Shaft  
46 Friction Member  
47 Spring  
48 49 Bevel gear  
52 Bearing  
53 Drive Motor

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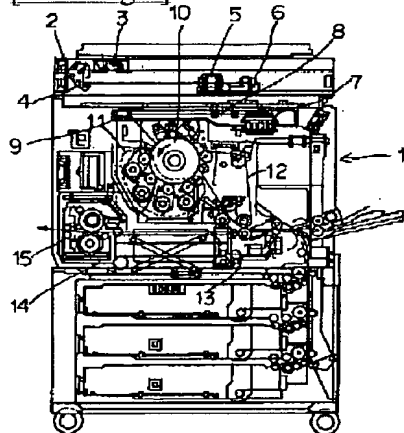
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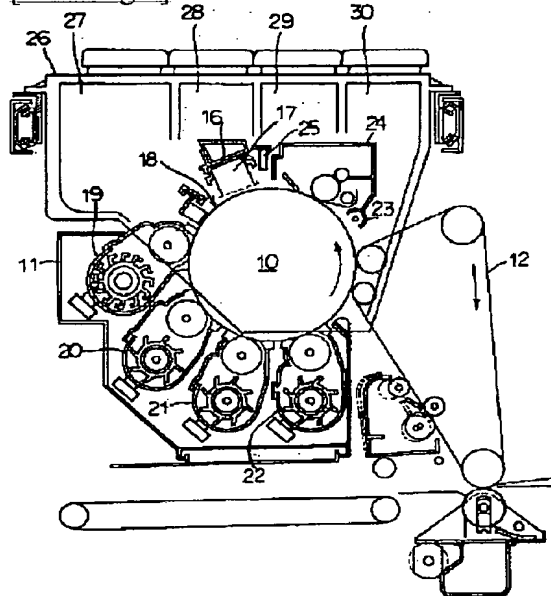
DRAWINGS

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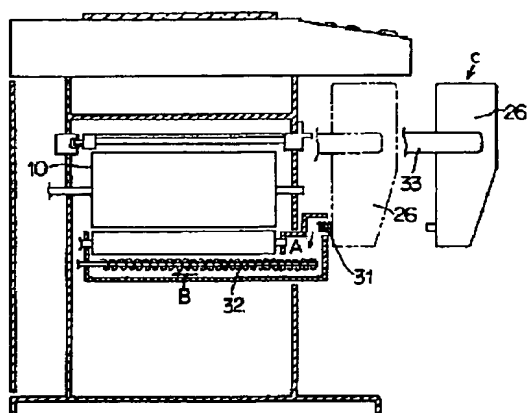
[Drawing 1]



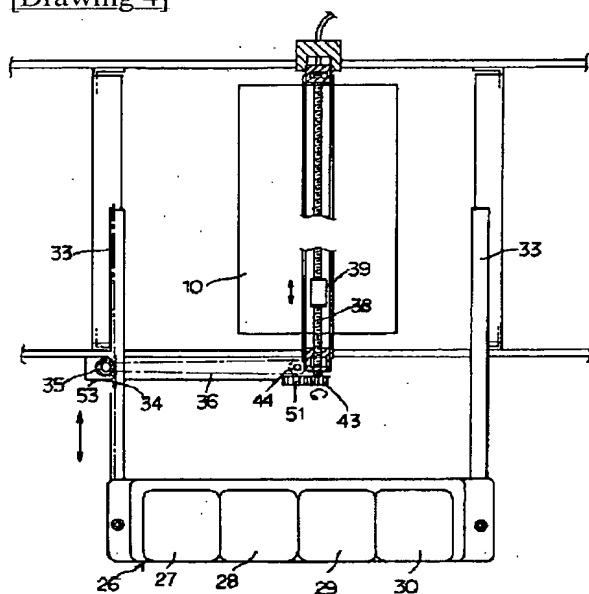
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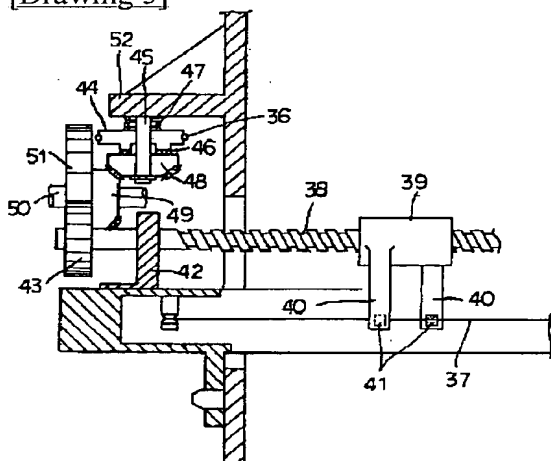
[Drawing 3]



[Drawing 4]



[Drawing 5]



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